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THE ANT LARVAE OF THE MYRMICINE TRIBE PHEIDOLOGETINI[1]

BY GEORGE C. WHEELER and JEANETTE WHEELER
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In the *Genera Insectorum* Emery included the genera *Lophomyrmex, Trigonogaster, Pheidologeton, Aneleus, Oligomyrmex, Erebomyrma, Carebara* and *Paedalgus* in the tribe Pheidologetini. Wheeler placed these genera in the Solenopsidini but admitted (1922, p. 659) that the latter tribe was "very unsatisfactorily defined." We have followed Emery.

The tribe Pheidologetini comprises about a hundred species, most of which are Paleotropical. The tribe is noted for the large size of the queens. In *C. vidua*, for example, the volume ratio of queen to worker is several thousand to one. *Pheidologeton* is a genus of harvesters, with a polymorphic worker caste ranging from minute minimae through a graded series to gigantic soldiers with enormous heads. The other genera are suspected of having relations with termites, though just what sort of relations has never been proved. At least they nest in termitaria. *Aneleus* and *Oligomyrmex* have the worker caste strongly dimorphic — large headed soldier and small worker. In *Lophomyrmex, Trigonogaster, Erebomyrma, Carebara* and *Paedalgus* the worker caste is monomorphic and minute.

In this article we have described the larvae of 13 species in seven genera. These larvae do not constitute a homogeneous group. They are nevertheless better defined as a group than are the larvae of the Solenopsidini (either in the sense of Emery or in the sense of Wheeler) to the extent that at least a few minor characters are common to all the known genera. The subtribes, however, are homogeneous and easily differentiated. Within each subtribe the genera are not easily distinguished.

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[1] The research on which this article is based was aided by a grant-in-aid from the Sigma Xi — Resa Research Fund.

Tribe PHEIDOLOGETINI Emery

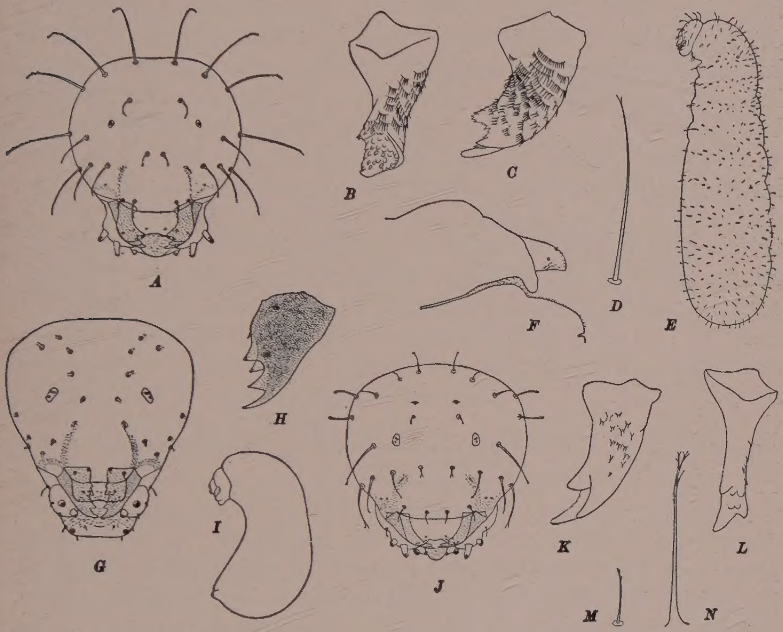
Body hairs moderately numerous and uniformly distributed. Anchor-tipped hairs absent. Antennae small. Head hairs few. Labrum short and broad (breadth 2× to 3× length). Ratio of head width to mandible length = 3.0 to 4.0; average 3.5. Ratio of mandible length to mandible width (at base) = 1.4 to 2.4; average 1.7. Surface of maxillae without spinules. Anterior surface of labium spinulose.

Subtribe LOPHOMYRMICINI Emery

Body hairs all of the same shape: either with the tip denticulate or with the tip bifid. Labrum trilobed, the median lobe projecting posteriorly. Posterior surface of labrum densely spinulose. Mandibles as a whole curved medially; teeth surrounding a denticulate area; anterior surface spinulose. Labium with a median anteroventral projection, which bears the opening of the sericteries at its apex. Labial palp a low knob bearing five sensilla. Hypopharynx spinulose.

Genus *Lophomyrmex* Emery

Thorax rather stout and bent ventrally at right angles; abdomen elongate-ovoidal; diameter greatest at the fourth and fifth abdominal somites; posterior end broadly rounded. Body hairs moderately numerous and short; all with the tip denticulate. Antennae small. Head hairs few, short to moderately long, with the tip denticulate. Labrum small, trilobed, with the median lobe projecting posteriorly; posterior surface densely spinulose. Mandibles slender and thin; curved medially; apical tooth curved medially and posteriorly; a large anterior subapical tooth directed anteroventrally; a large blunt medial tooth directed posteroventrally; teeth surrounding a denticulate area; anterior surface with several sharp spinules. Maxillary palp a peg bearing five sensilla. Labium with a median anteroventral spinulose projection, with the opening of the sericteries at its apex. Labial palp a low knob bearing five sensilla. Hypopharynx with a few oblique rows of minute spinules.



Text figure 1. *Trigonogaster recurvispinosa kemneri* Wheeler, A-F —A, head in anterior view, ×85; B, left mandible in medial view, ×247; C, left mandible in anterior view, ×247; D, body hair, ×329; E, larva in side view, ×18; F, left half of labrum and labium in sagittal view, ×165.

Erebomyrma sp., G-I —G, head in anterior view (with hair bases only), ×108; H, left mandible in anterior view, ×247; I, profile, ×18.

Lophomyrmex quadrispinosus (Jerdon), J-N —J, head in anterior view, ×85; K, left mandible in anterior view, ×192; L, left mandible in medial view, ×192; M and N, two body hairs, ×209.

Lophomyrmex quadrispinosus (Jerdon)
(Text. fig. 1, J-N)

Thorax rather stout and bent ventrally at right angles; abdomen elongate-ovoidal; diameter greatest at the fourth and fifth abdominal somites; posterior end broadly rounded, anterior end formed from the dorsum of the prothorax. Anus posteroventral. Leg vestiges present. Segmentation indistinct. Integument of ventral surface of thorax and abdominal somites I-III with numerous transverse rows of spinules. Body hairs moderately numerous, short (0.036-0.126 mm), all with denticulate tip; hairs without alveolus and articular membrane except on the prothorax. Head moderately large; cranium transversely subelliptical, breadth 1.25× length. Antennae small, each with three (rarely two) sensilla, each of which bears a spinule. Head hairs few, short to moderately long (0.018-0.072 mm), with denticulate tip. Labrum small, short (width 2× length), trilobed, the median lobe projecting posteriorly; anterior surface of each lateral lobe with three minute hairs and/or sensilla; ventral border of each lateral lobe with three sensilla and several short oblique rows of exceedingly minute spinules; posterior surface of each half with 1-2 isolated and a cluster of 3-4 sensilla; posterior surface spinulose, the spinules minute and in numerous long transverse rows. Mandibles slender and thin; curved medially; apical tooth curved medially and posteriorly; a large anterior subapical tooth directed anteroventrally; a large blunt medial tooth directed posteroventrally; teeth surrounding a denticulate area; anterior surface with several sharp spinules. Maxillae with the apex paraboloidal; palp a peg with one subapical (bearing a spinule) and four apical sensilla; galea a rather tall peg with two apical sensilla. Labium with a median anteroventral projection covered with short rows of minute spinules; palp a low knob with five sensilla (one of which bears a spinule); a minute sensillum between each palp and the opening of the sericteries; the latter a transverse slit on the end of the projection. Hypopharynx with a few oblique rows of minute spinules.

SEXUAL LARVA: Elongate-ovoidal; head small, on the ventral surface near the anterior end. Body naked. Head naked but with minute sensilla. Mandibles with all teeth directed medially. Otherwise similar to worker larva.

Material studied: numerous slightly damaged larvae from Java labelled "var. *opaciceps* Viehmeyer."

Genus TRIGONOGASTER Forel

Long, slender, club-shaped, with only the prothorax bent ventrally to form a very short neck; posterior end broadly round. Body hairs moderately numerous, very short, usually with a short-bifid tip. Antennae minute. Head hairs few, long and with some part of the distal half finely denticulate. Labrum trilobed, with the median lobe projecting posteriorly; posterior surface densely spinulose. Mandibles curved medially; apical tooth round-pointed and curved medially; a large anterior subapical tooth directed anteroventrally; a large blunt medial tooth directed posteroventrally and sometimes covered with spinules; teeth surrounding a denticulate area; anterior surface with many long slender spinules arranged in transverse arcuate rows. Maxillary palp a peg bearing five sensilla. Labium with a median anteroventral spinulose projection, with the opening of the sericteries at its apex; labial palp a low knob bearing five sensilla. Hypopharynx with numerous transverse rows of minute spinules.

Trigonogaster recurvispinosa kemneri Wheeler

(Text fig. 1, A-F)

Long, slender, club-shaped, with only the prothorax bent ventrally to form a very short neck; posterior end broadly rounded. Anus posteroventral. Spiracles small, the mesothoracic larger than the others. Integument with minute spinules on the ventral surface of the thorax. Body hairs moderately numerous, uniformly distributed, very short (0.018-0.108 mm), usually with very short-bifid tip; with alveolus and articular membrane. Head moderately large; cranium transversely subelliptical, slightly broader than long. Antennae minute, each with three sensilla, each of which bears a spinule. Head hairs few, long (0.04-0.105 mm) and with some part of the distal half finely denticulate. Labrum short (breadth 2× length), trilobed, the median lobe projecting posteriorly; anterior surface of each lateral lobe with 2-3 minute hairs and/or sensilla; ventral border of each lateral lobe spinulose and with one isolated and two contiguous sensilla; posterior surface of each half with 3-4 isolated and two contiguous sensilla; posterior surface densely spinulose, the spinules minute and in numerous long transverse rows. Mandibles curved medially; apical tooth round-pointed and curved medially; a large anterior subapical tooth directed anteroventrally; a large blunt medial tooth directed posteroventrally and sometimes covered with spinules; teeth surrounding a denticulate area; anterior surface with many long slender spinules arranged in transverse arcuate rows. Maxillae with the apex paraboloidal; palp a peg with one subapical (bearing a spinule) and four apical (two bearing each a short spinule) sensilla; galea a tall slender frustum with two apical sensilla. Labium with a median anteroventral projection covered with short rows of minute spinules; palp a low knob with five sensilla (three bearing a spinule each); opening of sericteries a short transverse slit on the end of the projection. Hypopharynx with numerous transverse rows of minute spinules. (Material studied: eight larvae from Java.)

Subtribe PHEIDOLOGETINI Emery

Body hairs of two or three types; those on the dorsal and lateral surfaces deeply bifid, with the branches curling away from each other. Labrum subrectangular, with the ventral corners rounded. Posterior surface of labrum sparsely spinulose or without spinules. Mandibles as a whole not curved medially; the teeth not surrounding a denticulate area; anterior surface without spinules. Labium without a median projection. Labial palp represented by a cluster of four sensilla. Hypopharynx apparently without spinules.

Genus *Pheidologeton* Mayr

Short and stout; prothorax forming a stout neck, which is bent ventrally to a right angle; dorsal profile C-shaped, ventral profile of abdomen nearly straight; diameter greatest at abdominal somites III and IV. Body hairs moderately numerous and short. Of three types (with intergrades): (1) deeply bifid, with the branches curling away from each other and enlarged at the tip, the most abundant type (but absent from the ventral surface); (2) bifid, with the branches acuminate and nearly straight, a few on the ventrolateral surfaces; (3) a few simple hairs on the ventral surface. Antennae small. Head hairs few, short, simple or with denticulate tip. Labrum subrectangular; posterior surface sparsely spinulose. Mandibles small, short, stout and thick; apex forming a small tooth which is curved medially and posteriorly; with two small medial teeth near the anterior surface. Maxillary palp a low elevation bearing four sensilla; galea a low knob. Labial palp represented by a cluster of four sensilla. *Sexual* (?) *larva* voluminous, plump, turgid, bean-shaped; head exceedingly minute, on the ventral surface near the anterior end; mandibles with the apical tooth vestigial and with only one medial tooth.

Pheidologeton diversus (Jerdon)
(Pl. 6, figs. 8-16)

MATURE WORKER LARVA: Length about 2.1 mm. Short and stout; prothorax forming a stout neck, which is bent ventrally to a right angle; dorsal profile C-shaped, ventral profile of abdomen nearly straight; diameter greatest at abdominal somites III and IV. Anus ventral. Leg vestiges present. Segmentation indistinct. Mesothoracic spiracle a third larger than the metathoracic, the others diminishing slightly toward the posterior end. Integument of dorsal surface of posterior somites sparsely spinulose, the spinules minute and isolated or in very short rows; on the ventral surface of the thorax and abdominal somites I and II they are in longer rows. Body hairs moderately numerous and short. Of three types: (1) deeply bifid, about 0.054 mm, with the branches curling away from each other and enlarged at the tip, the most abundant type, absent from the ventral surface; (2) bifid, 0.024-0.054 mm, with the branches acuminate and nearly straight, a few on the ventrolateral surfaces; (3) simple, about 0.024 mm, a few on the ventral surface; there are intergrades between the several types; a few hairs on the ventral surface have alveolus and articular membrane. Head large; cranium suboctagonal, but with the angles rounded, slightly broader than long. Antennae small, each with three (rarely four) sensilla each bearing a spinule. Head hairs few, short (0.006-0.036 mm), simple or with the tip denticulate. Labrum short and broad (breadth 3× length); subrectangular, with the ventral corners rounded; each half of anterior surface with 5-6 sensilla; ventral border with a few spinules and two isolated sensilla; posterior surface with 5-6 sensilla and three spinulose areas, a central area of minute spinules arranged in a few scattered short rows and two ventrolateral areas of coarse isolated spinules. Mandibles small, short, stout and thick; apex forming a small tooth which is curved medially and posteriorly; with two small medial teeth near the anterior surface. Maxillae with the apex paraboloidal; palp a low elevation bearing four sensilla; galea a low knob bearing two sensilla. Anterior surface of labium sparsely spinulose, the spinules isolated or in short transverse rows; palp represented by a cluster of four sensilla; an isolated sensillum between each palp and the opening of the sericteries; the latter a short transverse slit.

YOUNG LARVA: Length about 1.1 mm. Thorax bent ventrally to an acute angle; diameter nearly uniform but greatest at the third and fourth abdominal somites. Head relatively very large. Posterior end forming a knob which is directed posteroventrally. Otherwise as in the mature larva.

Material studied: two dozen larvae from the Philippine Islands.

EXPLANATION OF PLATE 6

Oligomyrmex parvicornis Forel, Figs. 1-7 —1, head in anterior view, ×115; 2, left mandible in anterior view, ×303; 3 and 4, two body hairs, ×418; 5, first instar larva in side view, ×39; 6, young larva in side view, ×39; 7, mature larva in side view, ×39.

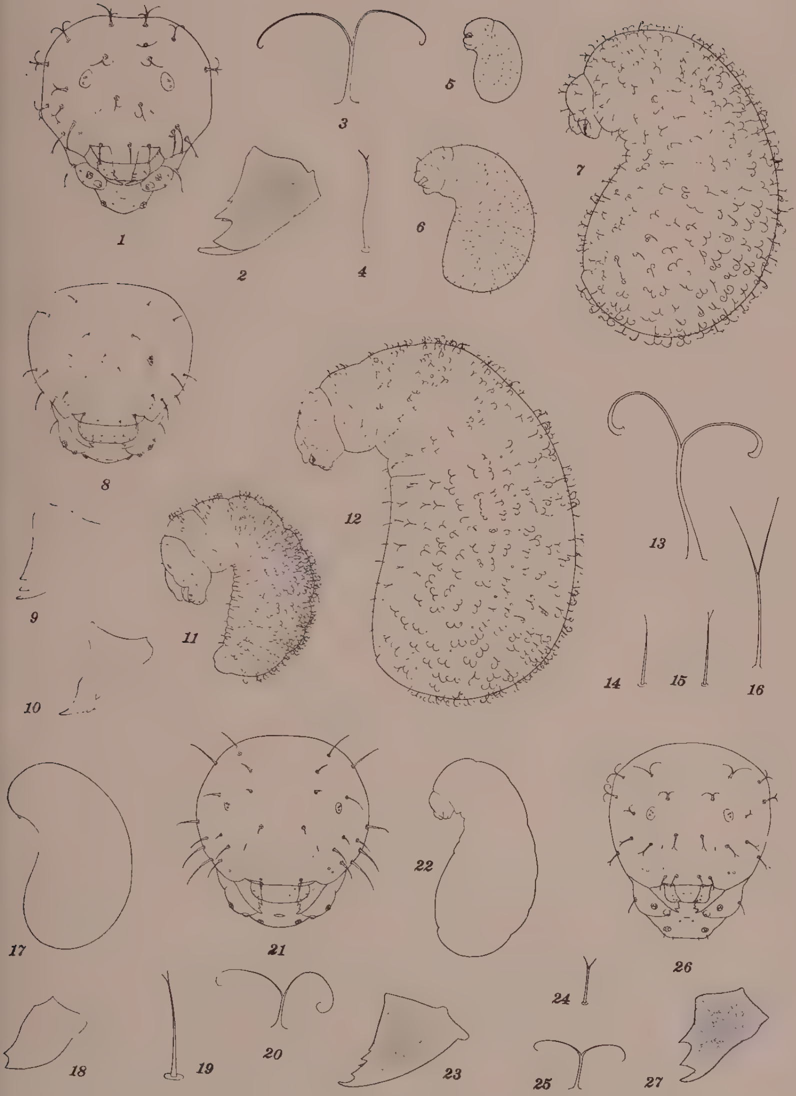
Pheidologeton diversus (Jerdon), Figs. 8-16 —8, head in anterior view, ×77; 9, left mandible in anterior view, ×209; 10, left mandible in medial view, ×209; 11, young larva in side view, ×36; 12, mature larva in side view, ×36; 13-16, four body hairs, ×418.

Pheidologeton affinis (Jerdon), Figs. 17 and 18 —17, profile of sexual (?) larva, ×2.7; 18, left mandible of sexual (?) larva in anterior view, ×209.

Carebara winifredae Wheeler, Figs. 19 and 20, two body hairs, ×418.

Carebara lignata Westwood, Figs. 21-23 —21, head in anterior view, ×108; 22, profile of worker larva, ×18; 23, left mandible in anterior view, ×245.

Paedalgus termitolestes Wheeler, Figs. 24-27 —24 and 25, two body hairs, ×329; 26, head in anterior view, ×132; 27, left mandible in anterior view, ×303.



WHEELER AND WHEELER — MYRMICINE LARVAE

Pheidologeton affinis (Jerdon)

(Pl. 6, figs. 17-18)

Sexual (?) larva: Length straight from end to end 8 mm; length from head to anus through spiracles about 12 mm. Voluminous, plump and turgid, bean-shaped. Head exceedingly minute, on the ventral surface near the anterior end. Mandibles somewhat smaller; apical tooth vestigial; only one medial tooth. Otherwise similar to *diversus* worker larva. (Material studied: six larvae from Dutch New Guinea; hairs broken off.)

Genus *Oligomyrmex* Mayr

Short and very stout; prothorax forming a short, very stout neck which is bent ventrally to a right angle; dorsal profile C-shaped, ventral sinuate; diameter greatest at abdominal somites IV and V. Body hairs short and moderately numerous. Of two types: (1) deeply bifid, with the branches curling away from each other, the most abundant type, absent from the ventral surface of the thorax; (2) a few on the ventral surface, with short-bifid tip. Head hairs few, short, varying in arrangement and shape. Labrum small and subrectangular; posterior surface sparsely spinulose. Mandibles with a long slender apical tooth which is curved medially; a large subapical tooth on the anterior surface; an acute medial tooth arising from the posterior surface near the middle of the mandible; one or two additional medial teeth may be present. Maxillary and labial palps each represented by a cluster of four sensilla; galea a low knob.

Oligomyrmex parvicornis Forel

(Pl. 6, figs. 1-7)

Mature worker larva: Length about 1.5 mm. Short and very stout; prothorax forming a short, very stout neck which is bent ventrally to a right angle; dorsal profile C-shaped, ventral sinuate; diameter greatest at abdominal somites IV-V. Anus ventral, with a posterior lip. Segmentation indistinct. Mesothoracic spiracle a third larger than the metathoracic and first abdominal (which are equal), the others exceedingly minute (one-third the size of the mesothoracic). Integument of midventral surface of thorax and abdominal somites I and II with a few long transverse rows of spinules. Body hairs moderately numerous, uniformly distributed, short. Of two types: (1) deeply bifid, 0.036-0.054 mm, with the branches curling away from each other, the most abundant type, absent from the ventral surface of the thorax (a few of this type are trifid or have the branches denticulate), without alveolus and articular membrane; (2) a few hairs on the ventral surface, 0.018-0.045 mm, with short-bifid tip, with alveolus and articular membrane. Head large; cranium suboctagonal in anterior view, slightly broader than long. Antennae with three (rarely two) sensilla, each bearing a short spinule. Head hairs few, short (0.018-0.036 mm), varying in arrangement and shape (simple or bifid or trifid or with short-bifid tip or long-branched with a few denticles.) Labrum small, short and broad (breadth 3× length); subrectangular, with the ventral corners rounded; anterior surface with four minute hairs, four sensilla and a few spinules; ventral border spinulose; posterior surface with six isolated sensilla and a few spinules. Mandibles heavily sclerotized; a trifle stout; apex forming a long slender tooth which is curved medially; a large subapical tooth on the anterior surface; an acute medial tooth arising from the posterior surface near the middle of the mandible; one or two additional medial teeth may be present. Maxillae with the apex paraboloidal; palp a cluster of four sensilla, two of which bear each a spinule and two a cap; galea a short knob with two sensilla. Anterior surface of labium sparsely spinulose, the spinules minute and in short rows; palp a cluster of four sensilla, two of which bear each a spinule and two a cap; a minute hair between each palp and the opening of the sericteries; the latter a short transverse slit.

FIRST INSTAR LARVA: Length about 0.27 mm. Body short, stout and subovoidal. Head very large, ventral. Hairs simple, about 0.006 mm long. Integument of dorsal surface with spinules in short transverse rows.

SECOND INSTAR LARVA: Similar to the first instar but with hairs up to 0.009 mm long.

YOUNG LARVA: Length about 0.73 mm. Short and stout with the prothorax curved ventrally to a right angle. Head very large. Body hairs very short (0.006-0.018 mm), most hairs on the ventral surface straight, with simple or bifid tip; elsewhere varied (simple and straight or flexible, or with bifid tip or deeply bifid). Integument of dorsal surface of abdominal somites VI-X with spinules in short transverse rows; a few minute spinules on the venter of the prothorax.

YOUNG LARVA: Length about 1.1 mm. Similar to mature larva.

Material studied: two dozen larvae from Queensland; courtesy of Dr. W. L. Brown.

Oligomyrmex jacobsoni Forel

Length about 1.36 mm. Body hairs shorter. With a sensillum between each palp and the opening of the sericteries. Otherwise as in *parvicornis*. (Material studied: numerous larvae from Java.)

Oligomyrmex mjöbergi Forel

Very similar to *parvicornis*. (Material studied: numerous larvae from Queensland; courtesy of Dr. W. L. Brown.)

Oligomyrmex thoracicus Weber

Weber, 1950, pp. 16-17: "The 6-mm. cell contained worker and female pupae, the latter 3.3 mm. in length, and a few larvae which could have been only female, being 1.8-2.3 mm. long. Early worker pupae were enclosed in the larval skin, the latter being 0.9 mm. long. The female larvae were as plump as those of *Atta*, one 1.8 mm. long having an abdominal diameter of 1.1 mm. and a head capsule of 0.25 mm. situated completely on the ventral side; no hairs were apparent. Worker larval skins on the other hand were covered with short hairs, bifurcate or trifurcate apically."

Oligomyrmex (*Aëromyrma*) *sundaicus* Forel

Very similar to *parvicornis*. (Material studied: 18 damaged larvae from Java.)

Genus EREBOMYRMA Wheeler

Short and stout; curved ventrally; posterior end conoidal and directed ventrally. Labrum small and subrectangular; the posterior surface sparsely spinulose. Mandibles with apex forming a long slender acute tooth which is curved medially; anterior surface with two large medial teeth. Maxillary and labial palps each represented by a cluster of four sensilla.

Erebomyrma sp.

(Text fig. 1, G-I)

Length about 2 mm. Short and stout; curved ventrally; posterior end conoidal and directed ventrally; anus at the tip of the conoid, with a conspicuous posterior lip; head ventral near the anterior end. Segmentation indistinct. Dorsal surface of posterior somites sparsely spinulose, the spinules minute and in very short transverse rows; ventral surface of anterior somites with more numerous and longer rows. Head large, subpyriform in anterior view. Each antenna with three sensilla, each of which bears a spinule. Labrum small, subrectangular in anterior view, short and broad (breadth 2.3× the length); anterior surface with four minute hairs, four sensilla and a few spinules; ventral border with six sensilla and a few spinules; posterior surface with four isolated sensilla and a few short rows of minute spinules. Mandibles heavily sclerotized; somewhat stout; apex forming a long slender acute tooth which is curved medially; posterior surface with one large medial tooth; anterior surface with two large medial teeth; medial surface may have a single denticle near the base. Maxillae rather small, lobose; palp a short frustum with four sensilla; galea a short subcone with two sensilla. Anterior surface of labium spinulose, the spinules minute and in short rows; palp represented by a cluster of four sensilla; an isolated sensillum between each palp and the opening of the sericteries; the latter a short transverse slit. (Material studied: two damaged larvae from Costa Rica; hairs broken off.)

Genus *Carebara* Westwood

Shaped somewhat like a crookneck squash; thorax forming a short, stout neck which is strongly curved ventrally; abdomen somewhat swollen. Body hairs moderately numerous and short. Of two types: (1) deeply bifid, with the branches curled away from each other, the most common type; (2) a few with short-bifid tip, restricted to ventral and ventrolateral surfaces. Antennae small. Head hairs few, short, simple. Labrum small and subrectangular; the posterior surface apparently without spinules. Mandibles small, short and stout; apex forming a short slender tooth;

two small medial teeth arise from the anterior surface and one from the posterior. Maxillary and labial palps each represented by a cluster of four sensilla.

Eidmann (1944, p. 458) characterized the sexual larvae of this genus as gigantic (*riesig*).

Wheeler, 1922, p. 171: The larvae of the sexual forms are "so voluminous that they could not be moved by the workers and are so soft and vulnerable that they would have to be reared in chambers inaccessible to the termites."

Carebara lignata Westwood
(Pl. 6, figs. 21-23)

MATURE WORKER LARVA: Length about 2 mm. Shaped somewhat like a crookneck squash; thorax forming a short, stout neck which is strongly curved ventrally; abdomen somewhat swollen; posterior end round. Anus posteroventral. Segmentation indistinct. Spiracles uniform in size. Integument of ventral surface of thorax with rather long transverse rows of spinules. Cranium subcircular in anterior view. Antennae small, each with three sensilla, each of which bears a spinule. Head hairs few, short (0.027-0.045 mm), simple, slightly curved. Labrum small, short and broad (breadth 3× length); subrectangular, but with the ventral corners rounded; anterior surface with about 10 sensilla; ventral border with a couple of isolated sensilla and with a few spinules at either side; posterior surface with six sensilla. Mandibles small, short and rather stout; apex forming a short slender tooth; two small medial teeth arise from the anterior surface and one from the posterior. Maxillae with the apex paraboloidal; palp represented by a cluster of four sensilla (two encapsulated and two bearing a spinule each); galea a short frustum bearing two apical sensilla. Anterior surface of labium spinulose, the spinules minute and in very short transverse rows; palp a cluster of four sensilla (two encapsulated and two bearing a spinule each); opening of sericteries a short transverse slit. (Material studied: numerous damaged larvae from Java.)

Carebara winifredae Wheeler
(Pl.6, figs. 19-20)

MATURE WORKER LARVA: Length about 2 mm. Body hairs moderately numerous and short. Of two types: (1) about 0.036 mm long, deeply bifid, with the branches curled away from each other, without alveolus and articular membrane, the most common type; (2) a few, 0.027-0.045 mm long, with short-bifid tip, with alveolus and articular membrane, restricted to the ventral surface of the abdomen and to the ventral and ventrolateral surfaces of the thorax. Integument of ventral surface of thorax and abdominal somites I and II with rather long transverse rows of spinules. Labium with an isolated sensillum between each palp and the opening of the sericteries. Otherwise similar to *lignata*. (Material studied: a dozen damaged larvae from British Guiana.)

Genus *Paedalgus* Forel

Abdomen spheroidal; thorax forming a short stout neck which is arched ventrally. Body hairs short and moderately numerous. Of two types: (1) deeply bifid, with the branches curling away from each other, the most abundant type; (2) a few with bifid tip, on the ventral surface. Head hairs few and short, those above the antennal level deeply bifid, those below with bifid tip. Labrum small and subrectangular; posterior surface apparently without spinules. Mandibles short and stout; anterior surface produced into a medial blade which bears two stout medial teeth; posterior surface with one medial tooth. Maxillary and labial palps each represented by a cluster of four sensilla.

Wheeler, 1922, p. 119: "That the salivary glands may be important as exudate organs throughout life is indicated by certain genera of Myrmicinae (e.g., *Paedalgus*), the larvae of which have no exudatoria but greatly developed salivary glands, though the latter are never used for spinning cocoons in the prepupal stage." (Mentioned by Wheeler 1928, p. 233 = 1926, p. 281.)

Paedalgus termitolestes Wheeler

(Pl. 6, figs. 24-27)

Abdomen spheroidal; thorax forming a short stout neck which is arched ventrally; segmentation indistinct (according to W. M. Wheeler). Integument of ventral surface of thorax with rather long transverse rows of minute spinules. Body hairs moderately numerous, uniformly distributed and short. Of two types: (1) deeply bifid, about 0.036 mm long, with the branches curling away from each other, the most abundant type, without alveolus and articular membrane, absent from the ventral surface; (2) a few on the ventral surface, about 0.018 mm long, nearly straight, with the tip bifid, with alveolus and articular membrane. Cranium transversely subelliptical in anterior view, slightly broader than long. Antennae each with three sensilla, each of which bears a spinule. Head hairs few, short (about 0.027 mm), those dorsal to the antennal level deeply bifid, ventral to the antennal level with bifid tip. Labrum small, short (breadth 2.2× length); subrectangular, but with the ventral corners rounded; anterior surface with about ten sensilla; posterior surface with about six sensilla. Mandibles short, stout and heavily sclerotized; apex slender and curved medially; anterior surface produced into a medial blade which bears two stout medial teeth; posterior surface with one medial tooth. Maxillae with the apex paraboloidal; palp represented by a cluster of four sensilla (two encapsulated and two bearing a spinule each); galea a short frustum with two apical sensilla. Anterior surface of the labium with a few rows of minute spinules; palp represented by a cluster of four sensilla (two encapsulated and two bearing a spinule each); an isolated sensillum between each palp and the opening of the sericteries; the latter a short transverse slit. (Material studied: a single damaged integument from the Congo.)

Bischoff (1927, pp. 94-95) cited Wheeler (1918) on trophallaxis in this species.

Forel (1922, p. 83 = 1928, Vol. I, pp. 462-463) cited the same.

Wheeler, 1918: "The larva has a singular shape, being almost spherical, with a short neck, small head and minute, bidenticulate mandibles. The delicate integument is studded with very short, stiff hairs, each of which has two recurved branches. The larvae, which are held together in compact masses by the interlocking of these hooked hairs, are fed with liquid food by regurgitation as is evident from the contents of their large spherical stomachs and the very feeble development of their mouthparts. Although, like other Myrmicinae, they do not spin cocoons but form naked pupae, they nevertheless possess huge salivary glands. Even in the very young larva the salivary receptacle on each side is full of a clear liquid secreted by the large cells of the two branches of the gland. In the nearly full-grown female larva the glands are very voluminous and their lumen and that of the receptacle full of secretion shown as dark, compact masses in the figure, which was, of course, drawn from a specimen hardened and dehydrated in alcohol. As such an amount of saliva would hardly be necessary for digestive purposes and as it is not used in the form of silk by the full-grown larva, it probably serves as a store of food for the nurses. The *Paedalgus* larvae, therefore, would seem to resemble the repletes of honey ants . . . except that the food for the workers is metabolized and stored as saliva by the larva, instead of merely being ingurgitated and stored in the ingluvies, or crop by a certain number of workers. From the fact that other Myrmicine ants, although they spin no cocoons, often have well-developed salivary glands, we may infer that these organs have much the same function as in *Paedalgus*" (pp. 301-302). Fig. 5 on p. 303: *A*, very young larva in side view showing internal anatomy; *B*, nearly mature female larva in side view showing salivary glands.

Wheeler, 1922: "They are white, nearly spherical, with short neck, small head, and very feebly developed mouthparts, indicating that they are fed by the tiny workers with regurgitated liquid food. They are . . . covered uniformly with short, stiff, sparse hairs, each of which has two recurved branches. Even in alcohol, the larvae cling compactly together in masses by means of these hooks. When stained and cleared, the larvae are seen to possess unusually voluminous salivary glands. The youngest individuals, scarcely 0.2 mm. long, have the receptacle full of clear secretion. In older larvae, the secretion after dehydration forms great masses in the receptacles and lumen of the glands. As these organs are not used in spinning a cocoon, it is very probable that the secretion . . . is elaborated and used as a food for the workers (trophallaxis)" (pp. 179-180). Fig. 43 on p. 179 = Wheeler, 1918, Fig. 5.

In this same article Wheeler concluded (pp. 118-119) from his study of the larvae of *Pachysima* spp. and "*Paedalgus infimus* (*vide infra*) . . . that the young larvae are fed by regurgitation, the older larvae with pellets of crushed insects, and that, especially during their younger stages, the larvae are so assiduously fed and cared for because they furnish liquid exudates, small in quantity, to be sure, but of such a quality as to excite the appetite of their nurses and induce regurgitation. I believe that the salivary glands, as soon as they develop, take on the function of supplying exudates." *Infimus* here must be a lapsus for *termitolestes*, since the only subsequent reference is to Santschi's description (see below) and there is no evidence that Wheeler ever studied the larvae of *infimus*.

Paedalgus infimus (Santschi)

Santschi, 1914, p. 365: "Les larves sont glabres." (Mentioned by Wheeler, 1922, p. 179.)

Wheeler, 1922, p. 118: See last paragraph under *P. termitolestes* above.

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SOME NEW SYNONYMS IN CLYTRINAE (COLEOPTERA, CHRYSOMELIDAE)

By F. Monros

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I list some new synonyms in Clytrinae, which have been established in the course of my work in connection with Junk's second edition of the "Coleopterorum Catalogus".

Not all the names in this list are plain synonyms; in most cases they represent different color patterns or minor differences in size and microsculpture which tend to be lost in large series. In my opinion, none of these differences is of either specific or subspecific value.

I have seen specimens (in several cases types or specimens from the typical series and typical locality) of all the names listed below.

Macrolenes (*Plecomera*) *quadraticollis* Lacord. from South Africa. Lacordaire, 1848, Mon. Phyt. II, p. 105 ♂.
= *M.* (*P.*) *varipes* Jacoby, 1901, Trans. Ent. Soc. Lond., **1901,** p. 217, pl. 10, f. 5.

Antipus (*Gyriodera*) *cruciata* (Thunb.) from South Africa. Thunberg, 1821, Nova Acta Upsala, 8, p. 184.
= *A.* (*G.*) *clitellata* Lacordaire, 1848, Mon. Phyt. II, p. 124.

Anomoea laticlavia (Forst.) from the United States and Central America. Forster, 1771, Nov. Spec. Ins., p. 27.
= *A. rufifrons* Lacordaire, 1848, Mon. Phyt. II, p. 135.
= *A. villosa* Jacoby, 1888, Biol. Centr. Amer. Col. 6, 1, Suppl., p. 67, pl. 36, f. 17 ♂.

Diapromorpha (*Peploptera*) *eckloni* Lacord. from south east Africa. Lacordaire, 1848, Mon. Phyt. II, p. 244.
= *D.* (*P.*) *dorsata* Lacordaire, l.c., p. 245.

Diapromorpha (*Peploptera*) *postica* Lacord. from equatorial Africa. Lacordaire, l.c., p. 251.
= *D.* (*P.*) *arcuata* Clavareau in Jacoby and Clavareau, 1906, Gen. Ins., fasc. **49**, p. 28, footnote.

Diapromorpha (*Peploptera*) *trilineata* Lacord. from South Africa. Lacordaire, 1848, Mon. Phyt. II, p. 246.
= *D.* (*P.*) *schenklingi* Clavareau, 1909, Ann. Soc. Ent. Belg., **53**, p. 386.

Diapromorpha (*Peploptera*) *abyssinica* Lef. from Ethiopia. Lefèvre, 1877, Rev. Mag. Zool., (3) 5, p. 225.
= *D.* (*P*) *schimperi* Lefèvre, 1891, Ann. Soc. Ent. Belg., **35**, c.r. p. CCLI.

Diapromorpha (*Peploptera*) *curvilinea* Jac. from South Africa. Jacoby, 1901, Trans. Ent. Soc. Lond.,, **1901.** p. 222, pl. 10, f. 9.
= *D.* (*P.*) *braunsi* Jacoby, 1903, Ent., **36**, p. 92.

Diapromorpha (*Aspidolopha*) *spilota* (Hope) from Nepal and Burma. Hope in Gray, 1831, Zool. Misc., p. 30 (*Cryptocephalus*).
= *D.* (*A.*) *thoracica* Jacoby, 1892, Ann. Mus. Civ. Genova, **32**, p. 879.

Melitonoma (*M.*) *decempunctata* (Oliv.), 1808, Ent., **6**, pl. 2, f. 24 from tropical and equatorial Africa.
= *M.* (*M.*) *patruelis* Lefèvre, 1891, Ann. Soc. Ent. Belg., **35**, c.r. p. CCLII.
= *M.* (*M.*) *pedestris* Lefèvre, l.c., p. CCLIII.
= *M.* (*M.*) *polysticta* Lacordaire, 1848, Mon. Phyt. II, p. 372.
= *M.* (*M.*) *maculigera* Lacordaire, l.c., p. 376.
= *M.* (*M.*) *sobrina* Lacordaire, l.c., p. 377.
= *M.* (*M.*) *litigiosa* Lacordaire, l.c., p. 378.

Megalostomis (*Megalostomis*) *amazona* Jac. from tropical America. Jacoby, 1876, Proc. Zool. Soc. Lond., **1876**, p. 809.
= *M.* (*M.*) *generosa* Baly, 1877, Cist. Ent., 2, p. 181.
= *M.* (*Minturnia*) *mariae* Monrós, 1951, Ann. Mag. Nat. Hist., (12) 4, p. 1154, f. 7-9.

Megalostomis (*Megalostomis*) *anachoreta* Lacord. from Central and northern South America.
Lacordaire, 1848, Mon. Phyt. II, p. 537.
= *M.* (*Minturnia*) *chuncho* Monrós, 1951, Ann. Mag. Nat. Hist., (12) 4, p. 1151, f. 4-5.
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Urodera crucifera Lacord. from the United States to northern Argentina. Lacordaire, 1848, Mon. Phyt. II, p. 454.
= *U. godmani* Jacoby, 1879, Proc. Zool. Soc. Lond., **1879**, p. 775.

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= *Babia amplicollis* Jacoby, l.c., p. 83.
= *Babia parvula* Jacoby, l.c., p. 83.

Babia rufipennis Lacord. from Brazil.
Lacordaire, 1848, Mon. Phyt. II, p. 433.
= *Babia undabunda* Lacordaire, l.c., p. 433.

TWO NEW TINGIDAE (HEMIPTERA)[1]

By Carl J. Drake

Ames, Iowa

This paper contains the descriptions of two new species of lacebugs, one from Australia and the other from the West Indies. The specimens were kindly sent to me by Dr. P. J. Darlington, Museum of Comparative Zoology, Harvard University. The types have been returned to the above Museum.

Teleonemia lustrabilis new sp.

Large broad, blackish fuscous with a slight tinge of ferrugineous. Length, 5.15 mm; width, 2.60 mm.

Head with four brownish spines; anterior pair short, porrect; posterior pair appressed, barely attaining base of frontal pair. Bucculae large, reticulate, contiguous in front. Rostrum brownish blackish apically, barely reaching beyond mesosternum; rostral channel wide, not closed behind; laminae not very high, dark fuscous, uniseriate, diverging posteriorly on mesosternum, more widely separate and cordate on metasternum. Orifice large, very conspicuous. Legs slender, smooth, moderately long, ferrugineous-fuscous. Antennae moderately long, moderately stout, straight, densely clothed with short, thick, recumbent setae; segments I and II very short, only slightly thickened, subequal; III rather stout, three times as long as IV (72:24), the latter barely enlarged. Pleura very coarsely pitted. Thorax beneath dark fuscous, the venter mostly brownish. Hypocostal laminae uniseriate, the areolae rounded. Orifice very large.

Pronotum distinctly transversely convex, coarsely punctate, tricarinate; each carina uniseriate and with dorsal vein strongly incrassate; median carina moderately elevated, distinctly arched on disc, composed of rectangular areolae (higher than wide), with two or three of the areolae longitudinally divided in widest part; lateral carinae less elevated, with dorsal boundary gradually rounded or arched

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[1] Published with a grant from the Museum of Comparative Zoology at Harvard College.

from base to apex. Hood moderately high, narrow, projecting almost one-third of its length over base of head, with median dorsal vein greatly thickened, a little longer than high. Paranota moderately wide, widest opposite humeral angles, there almost erect and four cells deep, only one cell wide in front, with short hind part back of widest part curved inwardly, the areolae moderately large and clear. Elytra longer and wider than abdomen, widest just behind apex of posterior projection of pronotum, broad and slowly rounded on hind margin, with tips partly overlapping; with exterior marginal vein considerably enlarged; costal area wide, with six dark transverse fasciae (a wide band at widest part of elytron, two narrower ones in front of and three behind wide band, the areolae densely clouded in bands and clear between bands); areolae larger and two deep in clear areas, smaller and three deep in bands; subcostal area wide, mostly triseriate, the areolae smaller than in costal and considerably clouded; discoidal area large, extending a little beyond middle of elytra, narrowed at both ends, with outer boundary sinuate, widest at middle, there five cells deep; sutural area large, the cells becoming larger apically, with several clear cells in apical part.

Holotype (female), Constanza, Dominican Republic, West Indies, 3000-4000 feet elevation, Dr. P. J. Darlington collector.

This large chocolate-colored species with some clear areolae in the costal area as the only characteristic markings is very distinct, and can be readily separated from its congeners by the size, form and the structures of the paranota, carinae and paranota as noted in the description. The outer vein of paranota, median vein of hood and dorsal veins of carinae are unusually incrassate. The clear areolae of costal area of elytra are arranged largely in blocks of two or four, thus giving the dark species a striking appearance.

Australotingis vinnula new sp.

Large, broad, testaceous with areolae hyaline. Head brown, concealed from dorsal aspect by hood; hind pair of cephalic spines long, appressed, testaceous, the median and anterior pair wanting. Length, 4.20 mm.; width, 2.25 mm.

Rostrum brownish with dark apex, extending to base of mesosternum; laminae uniseriate, with inferior edge finely toothed, testaceous, diverging posteriorly, entirely open behind. Bucculae testaceous, areolate, closed in front. Orifice present. Hypocostal ridge narrow, uniseriate. Antennae very long, slender, shortly pilose; segments I and II short, moderately stout, the latter smaller; III long, almost twice the length of IV; IV long, feebly swollen, clothed with longer hairs.

Pronotum moderately convex on disc, distinctly pitted, fuscous-brown, tricarinate, the hood, paranota and carinae testaceous; with clear cells; lateral carinae parallel, with dorsal edge rounded or arched for the entire length, composed of one row of rectangular cells; median carina strongly foliaceous, longer but not as high as hood, with dorsal vein rounded, highest a little back of the hood, there biseriate; hood large, moderately compressed laterally, inflated, longer than high, moderately narrowed anteriorly, strongly sloping downward. In front, with apex extending a little in front of the head. Paranota large, semiglobose, reflexed so that the outer margin projects almost vertically over pronotal surface with anterior and posterior ends curved inwardly. Elytra almost quadrate in outline, abruptly widened near base, much longer and wider than abdomen, with outer margins finely serrate, with apices broadly rounded and a little separated; costal area very wide, composed of large areolae, six cells deep in widest part; basal part of subcostal and discoidal areas jointly elevated so as to form a large tumid elevation; discoidal area not reaching middle of elytra, extending one half of its length beyond apex of hind pronotal process, five areolae deep in widest part, there more strongly inflated. Wings a little longer than abdomen, much shorter than elytra, whitish in color.

Type (male) and 3 *paratypes* (males), Lankelly Creek, McIlwraith Range, Cape York, Queensland, Australia, June 7, 1932, P. J. Darlington.

Separated at once from the only other member of the genus, *A. franzeni* Hacker, by the larger size, larger hood, longer antennae, larger paranota and higher and more arched median carina. The turned in ends of the paranota form a rounded-like opening above the disc of the pronotum. The lateral carinae are widely separated and terminate behind near the base and outer corners of the triangular pronotal process; anteriorly, they are a little removed from the sides of the hood.

ADDITIONAL NOTES ON BRACHYPANORPA. — In my recent account of *Brachypanorpa* (Psyche, 60:28-36, 1953), I pointed out that all known females of *B. carolinensis* (Banks) collected from 1905 through 1920 were short-winged and flightless, whereas all those collected since 1951 were long-winged and able to fly. I also noted that I had not located any specimens of this insect which had been collected during the interval between 1920 and 1951. Dr. J. Anthony Downes has more recently informed me that he collected *carolinensis* in the Black Mts., North Carolina, on June 10, 1938; the locality (near Mt. Mitchell, Toe River Gap, elevation 5500′) is the one at which my long-winged females were found in 1951 and 1952. Dr. Downes writes me that the females were "unable to fly but readily jumped several inches." One of the four females which he collected was sent to me for examination; it is clearly the short-winged type, like those originally found by Banks. The occurrence of these four females in 1938 indicates that the long-winged specimens had not appeared by that year (or at any rate that they were much in the minority) and that the female population did not change until after that time. Since I was unable to visit the *carolinensis* localities in the spring of 1953, I should also note that Mr. P. W. Fattig collected several long-winged females at Unicoi Gap., Georgia, on May 31, 1953, at the same locality that yielded numerous specimens in 1952.

A second female of *B. montana* Carp. was also recently sent to me by Dr. Downes, who collected it on Mt. McLoughlin, Oregon (June 25, 1939, 5000′ elevation). This is the type locality of the species, originally described from a series of nine males. The new specimen agrees with the individual illustrated in my 1953 paper. — F. M. CARPENTER, Harvard University.

CICINDELIDAE (TIGER BEETLES) COLLECTED IN EASTERN NEW GUINEA, WITH DESCRIPTION OF A NEW SPECIES[1]

By C. M. C. Brouerius van Nidek
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From material loaned to me by the Museum of Comparative Zoology, Cambridge, Massachusetts, U.S.A., I have compiled the following list, with notes, of tiger beetles collected in New Guinea by P. J. Darlington, Jr. during the recent war.[2]

1. *Cicindela tetrachoides* Gestro

Eight specimens collected at Dobodura, Papua.

2. **Cicindela darlingtoni** n. sp.

(Figs. 1-3, 6-7)

Resembles *C. latreillei* Guer., but differs by larger scutellum, longer pronotum, more dense curly pubescence on the underside, and especially by the hairs on the side margin of the labrum and the row of stiff hairs on the middle tibia (Figs. 1, 2). Head of male green; labrum strongly projecting, more rounded than in *latreillei*, yellow with dark margin, front margin with a small obtuse tooth at centre, side margin except anteriorly with a row of small hooked hairs; mandibles yellow, tips dark; palpi yellow, outer part of the last segment dark except at extreme tip. Head of female blackish; labrum black with green luster. Antennae with first 4 segments dark metallic, the rest pubescent. Prothorax more elongate than in *latreillei*, constricted near the base, with distinct but fine median line, and slightly transversely striated; apical edge with fine yellow hairs, basal edge especially at the angles with longer gold-colored hairs. Elytra of male more shining and less velvety than in *latreillei;* of female not shining but dull; of both sexes finely and rather densely punctured, with humeral spot and narrow apical margin yellow; epipleurae and apical third of suture of male yellow, of female scarcely so. Apex of each elytron separately rounded. Male below with coxae, metasternum, and sternites (except first and margin of second) yellow, the rest shining green; episterna of pro-, meso- and metathorax, mesosternum, margin of the metasternum, and first sternite with dense, curly hairs; legs yellow, femora with greenish luster; basal ⅔ of femora with long, curly hairs; tarsi dark; apex of the protibiae with stiff hairs; meso-tibiae outwardly with a fringe of short pale bristles; meta-tibiae compressed; claws long. Female with pubescent parts of underside metallic green and the rest dark; trochanters yellow; legs darker than in male, with tibiae yellow. Male copulatory organs as figured (Fig. 3).

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[1] Published with a grant from the Museum of Comparative Zoology at Harvard College.

[2] Two additional species, *Caledonomorpha milneana* and *Prothyma papua*, have been described by Dr. Darlington in *Psyche*, Vol. 54, 1947, pp. 241-245. Darlington's collecting localities are shown on his sketch map in the *Bulletin of the Museum of Comparative Zoology*, Vol. 107, 1952, p. 93.

Length: 12.5 mm. (without labrum).

Holotype ♂ and allotype ♀ in the Museum of Comparative Zoology (Type No. 28,997) and 1 ♀ paratype in my collection all from DOBODURA, PAPUA, collected by P. J. Darlington Jr., for whom, of course, the species is named.

3. *Cicindela decemguttata urvillei* Dej.
(Figs. 4-5)

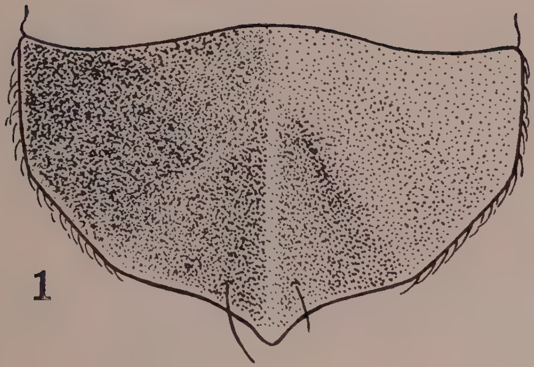
Of the six specimens, from Dobodura and Milne Bay, belonging to this subspecies only two have the typical markings of *urvillei* Dej. The other specimens are aberrations which need not be named but are worth mentioning here. They are (a) two specimens without the humeral top-fleck (Fig. 4); and (b) two specimens with the discal spot connected with the upper marginal spot, which is in turn connected with the lower marginal spot (Fig. 5). One specimen of "a" has one elytron as in "b".

4. *Cicindela discreta* Schaum.

Two specimens from Dobodura, Papua.

EXPLANATION OF PLATE 7

Figs. 1-3, *Cicindela darlingtoni,* n. sp.—1, labrum; 2, middle tibia; 3, male genitalia. Figs. 4-5, *Cicindela decemguttata urvillei* Dej.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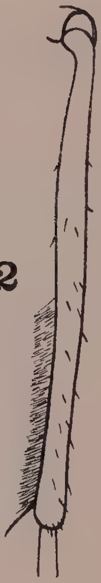
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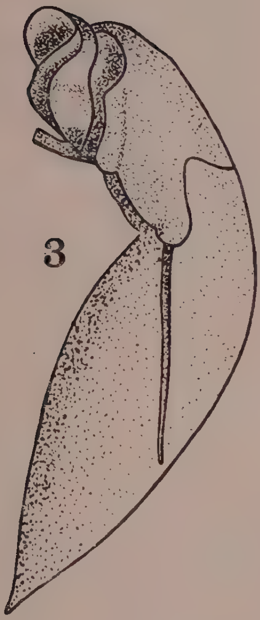
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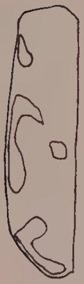
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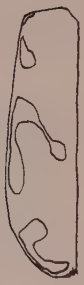
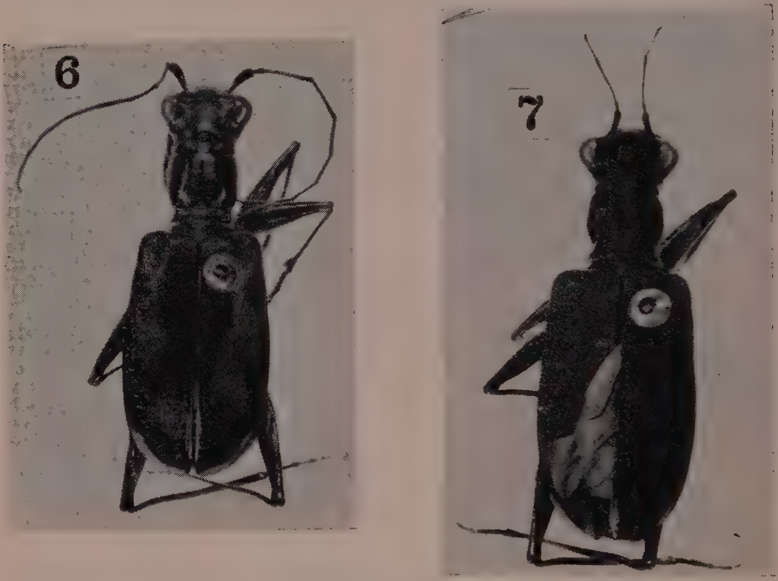

5

VAN NIDEK — NEW GUINEA CICINDELIDAE

5. *Cicindela semicincta* Brullé

Four specimens from Dobodura, Papua, which are totally black. These are to be considered as a nigra-form of *semicincta* Brullé.



Figs. 6-7. *Cicindela darlingtoni*, n. sp. Fig. 6, male; fig. 7, female.

6. *Cicindela io* W. H.

Three specimens from Milne Bay, Papua.

7. *Cicindela io microgemmea* W. H.

Dobodura, Papua, four specimens.

8. *Cicindela bennigsenia* W. H.

Walter Horn observed in *Records of the South Australian Museum*, 1932, page 551, that males of *Cicindela bennigsenia* collected on the Mount Lamington Plateau in N. E. Papua differ in shape of labrum from the specimens described by him. A male collected by Dr. Darlington at Dobodura has a labrum of the same shape as the Mount Lamington males. The labrum is rather strongly excavated at middle, without the slightest trace of a sagittal tooth.

9. *Cicindela funerata barbata* W. H.

Of this subspecies there are six examples from Dobodura, three from Milne Bay, two from vicinity of Nadzab, and thirteen from Morobe District (Surprise Creek). The first two of these localities are in Papua; the other two, in N.E.N.G. Specimens from the different localities differ slightly in color. Those from Milne Bay are more greenish; from Nadzab, more reddish; and from Surprise Creek, darker than those from Dobodura. In three examples (one from Milne Bay and two from Surprise Creek) the humeral lunule is divided into two separate spots. The penis, clearly visible in several males, shows slight differences even among specimens from the same locality.

10. *Cicindela guineensis umbrosa* W. H.

Dobodura, Papua, six specimens.

11. *Cicindela ancorifera* W.H.

Four examples from Chimbu Valley (Bismarck Rge.), 5,000-7,500 ft. altitude, and five from Morobe District, Mt. Misim, 6,400 ft. (both localities in N.E.N.G.). These specimens possess middle and apical white spots on each elytron. Typical specimens ought to have three white spots. Of about 40 examples I have seen from the London and Leiden museums almost all had only the middle spot, and only a few a slight indication of the apical spot. As I have already mentioned in *Notes from the Museum Leyden,* I am of the opinion that these are merely aberrations.

THE INDO-AUSTRALIAN SPECIES OF THE ANT GENUS *STRUMIGENYS* FR. SMITH: GROUP OF *DORIAE* EMERY[1]

BY WILLIAM L. BROWN, JR.
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The *Strumigenys doriae* group includes three rather large species of uniform aspect with a scattered distribution in the East Indies. The mandibles are greatly simplified, evidently through loss of structures, and are like those of the Neotropical *elongata* group in lacking entirely preapical teeth or distinct dentiform angles in the preapical position. The apical fork teeth are strong and spiniform, straight or nearly so; an intercalary denticle may be present or absent. Mandibular blades straight, slightly narrowed at insertions; vertex raised and convex; occipital lobes strongly depressed; posterior excision deep. Labrum transverse, with a narrow, apically truncate extension on each side extending laterally beyond the lateral borders of the closed mandibles. Legs and antennae long and slender; funicular segment IV elongate. Body, including legs with very long, fine outstanding hairs. In the two species actually examined (*S. bryanti* and *S. ulcerosa*), the sculpture of certain areas is modified to include coarse pits and larger, shallow, margined crateriform areas in bilaterally paired positions. These regions are ordinarily plated or encrusted with a light-colored granular substance, which, when removed by soaking, leaves uncovered impressed areas filled with short, fine dense pile. The whole apparatus appears to be secretory in function, though for what purpose, it is still not known.

These structures, which I refer to as secretory pits and lacunae, appear to be special intensive developments of a widespread general tendency among strumigenite species to produce a granular integumental covering. This covering is not an artifact, since it can be seen in living speci-

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[1] Published with a grant from the Museum of Comparative Zoology at Harvard College.

mens in nature and in the artificial nest in a certain proportion of individuals in most colonies at any given time. Its structure is vaguely granular, and appears to be too amorphous to represent a vegetable growth. It is highly resistant to organic solvents, and even to strong acids and bases up to the point where these begin to attack the integument itself. It can sometimes be loosened in water, but does not show appreciable reduction after prolonged soaking. It appears most likely to be a direct secretion of a largely proteinaceous nature. Similar-appearing incrustations are frequent in the myrmicine tribes Basicerotini and Attini, though phylogenetic relationships between these and the Dacetini (*Strumigenys*, etc.) do not appear to be very close. Most species showing the secretion in the Basicerotini and Dacetini show other structural and behavioral convergences, and are, generally speaking, members of the *microgenton* of Silvestri. The dacetines feed chiefly upon certain collembolan families, and it is possible that this secreted crust has something to do with the predatory habit. Among undescribed *Strumigenys* from the New World tropics, I have seen other forms with secretory lacunae, though placed differently to those of the *doriae* group and probably developed convergently.

It is unfortunate that each of the three species treated below is known only from the unique type, a situation which makes taxonomic conclusions somewhat uncertain. The characters given to separate the three are, however, of a degree of distinctness equal to those seen in related *Strumigenys* species known from considerably more satisfactory samples. Emery's brief and somewhat questionable diagnosis with figure of *S. doriae* remains to be checked and amplified by some future specialist having access to the type.

The measurements and their abbreviations are those I have used in various works on the dacetine ants: TL, total length, or sum of lengths of the various tagmata, including the closed mandibles; HL, maximum measurable length of head in dorsal view, including all of clypeus and occipital lobes; ML, distance to which the closed mandibles project beyond the clypeal margin, measured while head is in same position as for HL measurement; WL, diagonal length of alitrunk measured from lateral view. The most useful indices are: CI, cephalic index, head width/ HL × 100; MI, mandibulo-cephalic index, ML/HL × 100.

Strumigenys ulcerosa new species

Holotype worker: TL 4.10, HL 1.09, ML 0.55, WL 1.16 mm.; CI 71, MI 50. Occipital lobes surpass indistinct anterior pronotal margin by approximately 0.1 mm.; this overlap not included in TL.

In general habitus resembling Emery's figure of *S. doriae* (see below), but the mandibles longer and much broader, and the head less broad behind, assuming that Emery's figure approaches the correct proportions for *doriae*. Sides of head in front of occipital lobes feebly concave in outline; eyes moderate in size and convexity, situated distinctly anterior to the cephalic midlength, visible in dorsal view. Clypeus triangular, the anterior border weakly depressed and very feebly concave. Seen from the side, the deepest part of the head is reached at the highest point of the convex vertex, slightly posterior to cephalic midlength; occipital lobes only about half as deep, strongly depressed. Scape L 0.68, funiculus L 0.85 (segment V 0.40, IV 0.24, III + II 0.10, I 0.11 mm.).

Mandibles approximately straight, depressed, broad (slightly less broad than in *S. bryanti* holotype), at bases slightly narrowed and feebly bent inward, broadest at about the apical quarter. Just before the apical fork, the inner border becomes very feebly concave, but there is no preapical angle marking off this concavity, and there is no preapical tooth or denticle. Dorsal tooth of apical fork stoutly spiniform, L 0.14-0.15 mm., only slightly longer than the ventral tooth, which is blunter and approximately parallel; no trace of any intercalary tooth or denticle.

Alitrunk slender, pronotum narrowly rounded anteriorly, without humeral angles, but with a low tubercle on each side; anterior pronotal border obsolete. Pronotum with the entire mesonotum forming one continuous gently arching profile as seen from the side, sloping posteriorly to the well-marked metanotal groove. Propodeal dorsum sloping down posteriorly from the groove, only very feebly convex. Mesosternal groove very broad and deep, taking up approximately the anterior half of the mesosternum, lined with an abundant erect pile, apparently related to some secretory function. Propodeal teeth reduced to small, inconspicuous, depressed blunt processes, completely involved in the broad, convex infradental lamellae.

Petiole arched-claviform, the node long, low, scarcely differentiated from its peduncle as seen from any view. Ventral spongiform strip fairly well developed, not deep; posterodorsal collar rather broad, ending on each side in well developed posterolateral flaps, each of which is in turn extended as a slender, anteriorly tapered strip forward along the sides of the node about to the level of its indefinite juncture with the peduncle. Postpetiolar node seen from above subcircular, very nearly as long as broad and slightly broader than the petiolar node, convex, closely surrounded by spongiform tissue and with large ventral spongiform lobes. Gaster with a conspicuous thick anteroventral pad of spongiform tissue and fine, short subreclinate hairs, anterodorsally with a flange-like transverse spongiform margin. Basal costulae of first gastric segment rather fine, short, extending about ¼ the length of the basal segment in the middle; remainder of gaster smooth and shining, as are the mandibles.

Head, alitrunk and both nodes densely and irregularly punctulate-granulose, opaque. The ground punctulation is relieved at intervals by larger, more irregular secretory pits, most conspicuous on head and promesonotum. The larger secretory lacunae, bordered by a low ridge and usually conspicuous by virtue of the whitish encrustation, appear to be formed of many confluent secretory pits. The largest pair are subcircular, located behind the humeral tubercles, occupying the greater part of the posterolateral pronotal surfaces. Another large linear pair, deep and groove-like, follow the humeral margins on each side; and another pair, adjacent to and surrounding the lateral openings of the mesosternal groove, are also of good size. A smaller, but very distinct groove on each side of the propodeum below the spiracle, running posteriorly onto the infradental lamella. Small lacunae are also found on the anterolateral faces of the petiolar node, dorsolaterally on the propodeum at the bases of the teeth, and on each end of the metanotal groove. Legs densely and finely punctulate-granulose. Pilosity as described for *S. bryanti* (below), except that in *ulcerosa,* the long, fine erect hairs on the head are more numerous, while those of the gastric dorsum are not so extremely long (maximum length about 0.26 mm.), nor are those on the legs so long as in *bryanti.* In *ulcerosa,* the longest hairs on the gastric dorsum are about half as long as the maximum dorsoventral thickness of the gaster. The dense, fine pile present on alitrunk and nodes much as in *bryanti,* most conspicuous at heavily "glandular" areas, especially humeri and mesopleura.

Color rich medium ferrugineous, appendages and occipital lobes slightly lighter and more yellowish.

Holotype, in the Museum of Comparative Zoology, a unique taken at 700 meters altitude, Kananggar, Soemba, Indonesia (Dammerman, no. 242). This species does not seem to be the worker corresponding to the female of *bryanti,* since the latter has a narrower, not broader, head, and has longer mandibles, differently proportioned funicular segments, longer gastric pilosity, and a minute intercalary denticle in the apical fork. If it be assumed that Emery did not too grossly misfigure his Ambonese species, *doriae,* the latter would be distinct from *ulcerosa* in having shorter, very much more slender mandibles and a notably broader head. Emery's draftsmanship, however, was such that doubts about the distinctness of *ulcerosa* and *doriae* will remain until someone can review Emery's type.

Strumigenys bryanti Wheeler

Strumigenys bryanti Wheeler, 1919, Bull. Mus. Comp. Zool. Harvard 63: 95, female (original description).

Holotype female, alate: Differs significantly in proportions, especially of the mandibles, and also in other minor details, from *S. ulcerosa* and *S. doriae,* but for the most part very similar to at least the first of these. TL 4.63, HL 1.08, ML 0.60, WL 1.25 mm.; CI 69, MI 56; occipital-pronotal overlap 0.1 mm., subtracted from TL. Antennal scapes straight, slender, L 0.70, very feebly incrassate in the apical half; funiculus slender, L 0.88 (segment V 0.40, IV 0.31, II + III 0.08, I 0.09-0.10 mm.).

Mandibles with apical fork of two slender spiniform teeth, the dorsal tooth virtually straight in its apical half, the ventral tooth parallel to the dorsal and about half as long, its extreme tip gently deflected ventrad; a single minute, acute intercalary denticle present. The dorsal apical tooth is about 0.17 mm. long, or slightly more. Shaft of mandible straight, broad, depressed, slightly narrowed toward base; external border feebly convex, inner border straight, except for brief weakly concave apical and basal stretches, and with dorsal and ventral subcultrate margins. The gentle preapical concavity, just at the point where it joins the straight section of the inner border, bears a very low, obtuse vestige of a translucent angle, just barely perceptible at higher magnifications and then only in certain views. This insignificant vestige is probably homologous with the preapical tooth or angle in the majority of Indo-Australian *Strumigenys* species. The reduction of the preapical tooth can be followed in the series *koningsbergeri*, *formosensis*, *bryanti*, although this series probably does not represent the actually evolved lineage.

The secretory pits and lacunae are arranged much as in the worker of *S. ulcerosa*, but those on the thoracic sclerites are somewhat restricted by the different development of these areas accompanying the presence of the wings. Scutum intricately and rather deeply rugulose-punctulate. Scutellum with similar sculpture; punctulation of mesokatepisternum partially effaced, the surface here more or less smooth and shining. Basal costulae of gaster short and fine.

Head with moderate growth of fine, subreclinate ground hairs, fewer moderately long, fine erect hairs, and fewer still very long, outstanding, fine flagellate hairs, the latter concentrated along the dorsolateral and posterior occipital borders. Scape hairs very fine, reclinate. Alitrunk with numerous long, fine erect hairs, the same, becoming longer and flagelliform on both nodes and gastric dorsum (L up to 0.55 mm.), where some are as long as or nearly as long as the maximum depth of the gaster itself. Legs with very long, fine erect hairs, becoming extremely long and tapered, but fewer, on the posterior surfaces of the metatarsi, where they are often nearly as long as the elongate metatarsus itself. Also present on legs, alitrunk, both nodes and underside of head is a dense pile of very fine, short reclinate hairs, inconspicuous except on humeral borders, propodeum and petiolar node; forming a large anteroventral pad at the base of the gaster. The long flagelliform hairs are considerably longer than those of *ulcerosa*.

Color reddish ferrugineous, appendages lighter. Forewing (L 3.1 mm.) with R + Sc, Rsf1, stigma and 2r present and distinct, but not strongly pigmented. Other veins absent or else present only as indistinct folds or lines. The holotype, still the only known specimen, is in the Museum of Comparative Zoology; it was taken on Mt. Matang, West Sarawak, Borneo (G. E. Bryant).

Strumigenys doriae Emery

Strumigenys Doriae Emery, 1887, Ann. Mus. Civ. Stor. Nat. Genova, (2) 5: 45, pl. 2, fig. 22, worker (original description). 1897, Term. Füzetek, 20: 574, worker, in key.

I know this form only from Emery's description and figure, which show it to be very much like *S. ulcerosa* (see discussion above). The original description is very brief, and the figure crude and questionable on several accounts. The mandibles are portrayed as unusually slender for a *Strumigenys* species; nevertheless, Emery definitely says that they are "*cylindricis*" in his description, which, if true, would make them quite different from the broadened and depressed jaws of the two closely related forms. As estimated from the figure, the CI would be about 77, and the MI near 46. Emery's figures of dacetines are known, however, to err rather strongly on occasion in showing correct proportions of head and mandibles. Emery also shows the petiolar and postpetiolar nodes without differentiating the spongiform appendages from the nodes proper. The total length is given as "3½ mm." This is probably too low a figure. Emery does not mention the secretory pits and lacunae that may well be present, but the elongate flagellate hairs characteristic of this species group are indicated in the figure. Color given as "ferruginea, capite obscurior."

The holotype is a unique worker taken at Amboina, East Indies, by Beccari; it is presumably now in the Emery Collection, Museo Civico di Storia Naturale in Genoa, Italy.

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